

(12) **UK Patent Application** (19) **GB** (11) **2 388 863** (13) **A**

(43) Date of A Publication 26.11.2003

(21) Application No: 0218151.9  
 (22) Date of Filing: 05.08.2002  
 (30) Priority Data:  
 (31) 0211655 (32) 21.05.2002 (33) GB  
 (60) Parent of Application No(s)  
 0302181.3 under Section 15(4) of the Patents Act  
 1977

(71) Applicant(s):  
**Peter Savage Limited**  
 (Incorporated in the United Kingdom)  
 Liberty House, Liberty Business Park,  
 Attleborough, NUNEATON, Warwickshire,  
 CV11 6RX, United Kingdom

(72) Inventor(s):  
**Peter Derrick Savage**

(continued on next page)

(51) INT CL<sup>7</sup>:  
**E02D 29/14**

(52) UK CL (Edition V):  
**E1G G94B G94J G94L G96B G96J G96K G96L**

(56) Documents Cited:  
**GB 2226841 A EP 1201829 A1**  
**EP 0808951 A1**

(58) Field of Search:  
 UK CL (Edition T) E1G  
 INT CL<sup>7</sup> E02D, E03F  
 Other: **ONLINE:WPI,PAJ,EPODOC**

(54) Abstract Title: **Manhole cover or gully grating**

(57) The manhole cover or gully grating comprises a frame 12 and a plurality of cover or grating parts 14a-d with the parts all being hinged to the same side of the frame and each having a generally triangular shape. Each cover part is preferably in a three point contact with the frame and there are preferably an even number of cover parts. Adjacent cover parts may be loosely connected or one cover part may include a formation 64 which overlaps an adjacent cover part so that two or more cover parts can be lifted together. The cover parts are preferably arranged to sit on seats 34,36 on the frame and one seat may support corners of a number of cover parts. Preferably at least one cover part can be locked to the frame and the seats and hinges are preferably arranged outside the clear opening of the frame. Each hinge is preferably formed from only two elements, a fork which receives a boss, that are integral to the frame and cover parts. The boss and fork may be shaped so that the cover part moves downwards after a certain angle of movement and an element on the cover part then engages a part of the frame to inhibit movement in the return direction. A portion of the boss may have a non-rounded engagement surface, preferably a flat while the fork may include a rounded surface to engage the boss. The fork is preferably on the cover part and the boss on the frame.

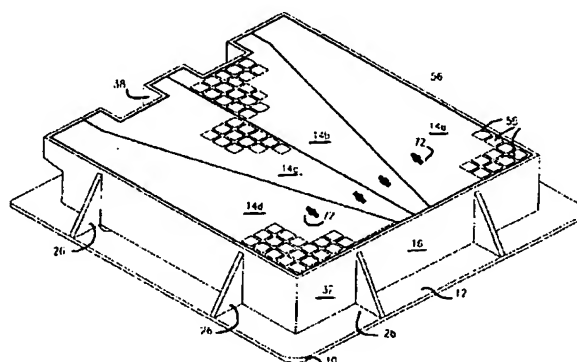


Fig. 1

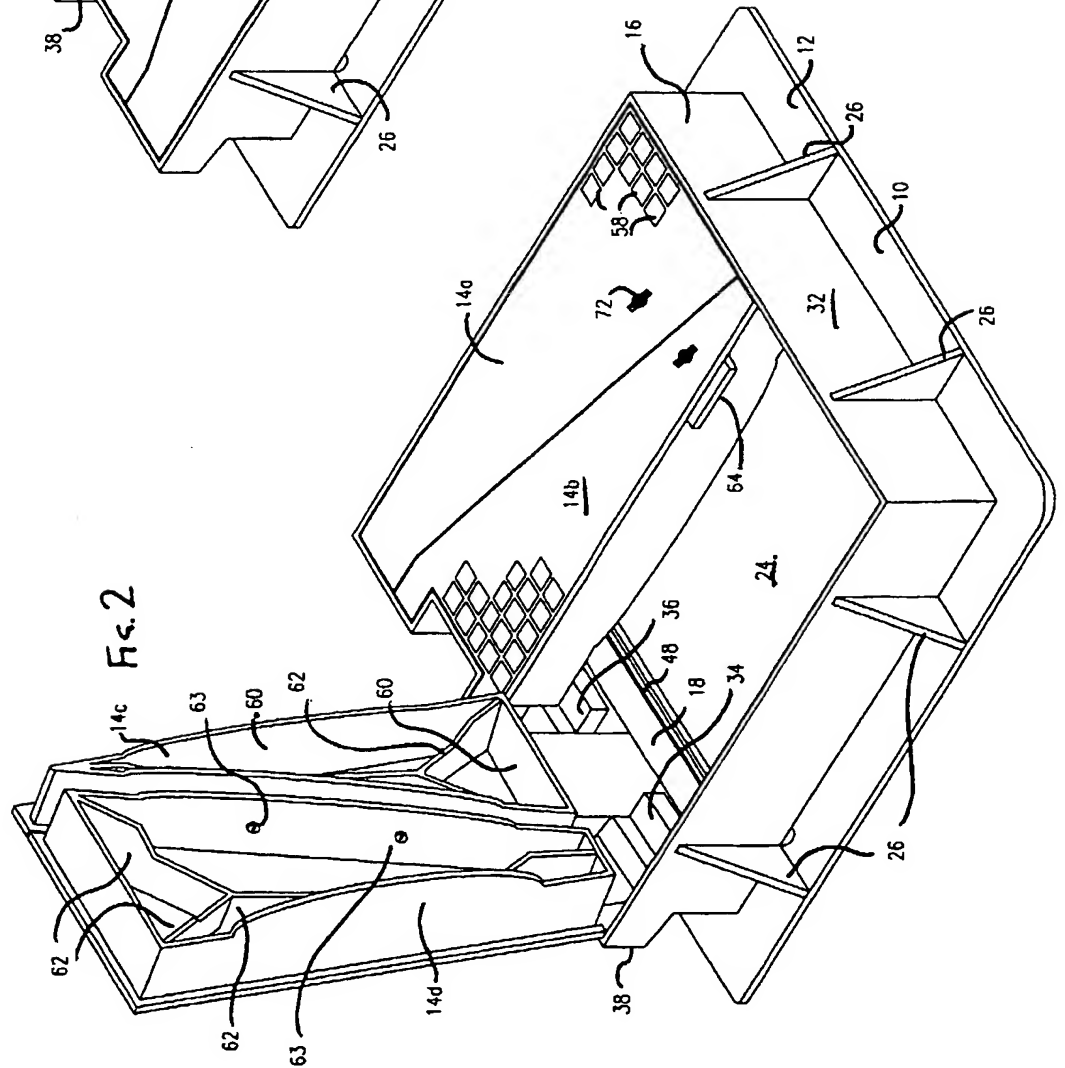
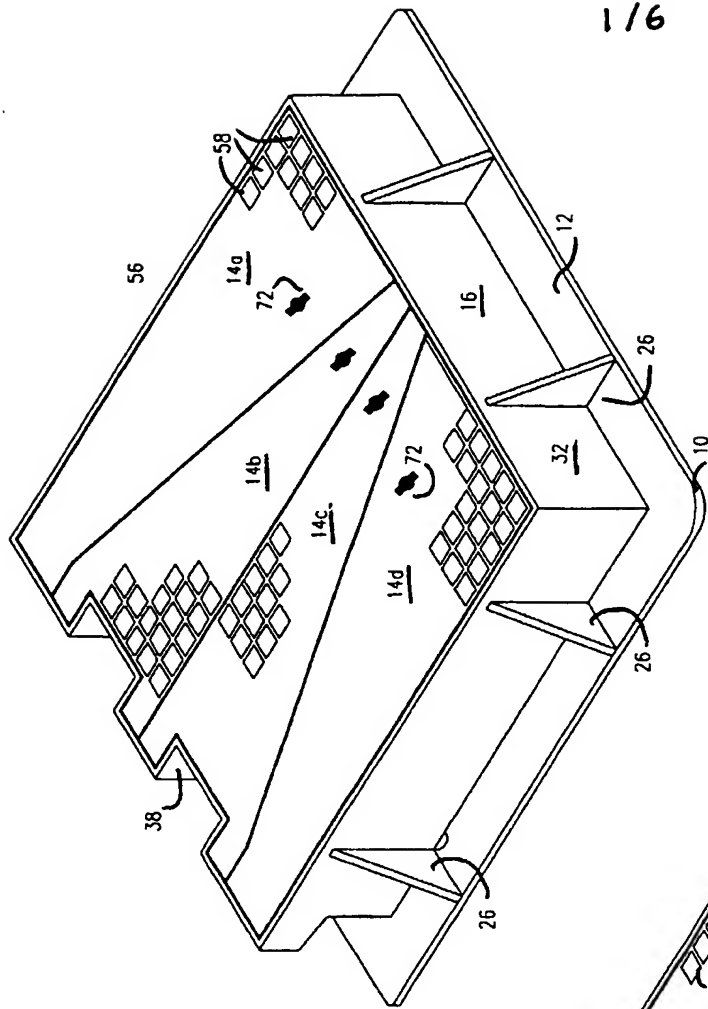
GB 2 388 863 A

GB 2388863 A continuation

(74) Agent and/or Address for Service:

**Withers & Rogers**

**Goldings House, 2 Hays Lane, LONDON,  
SE1 2HW, United Kingdom**



216

Fig 3

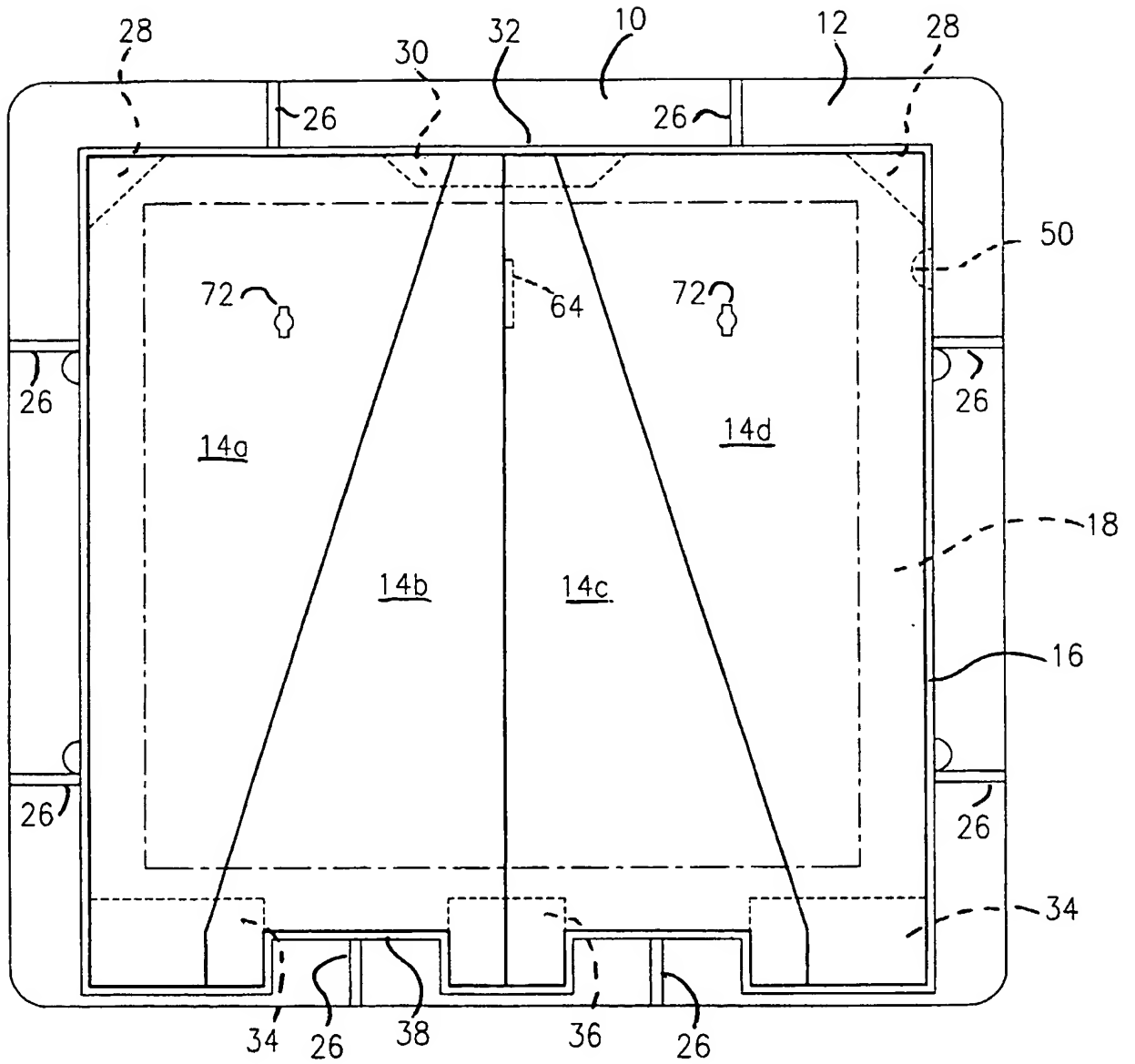


Fig 4

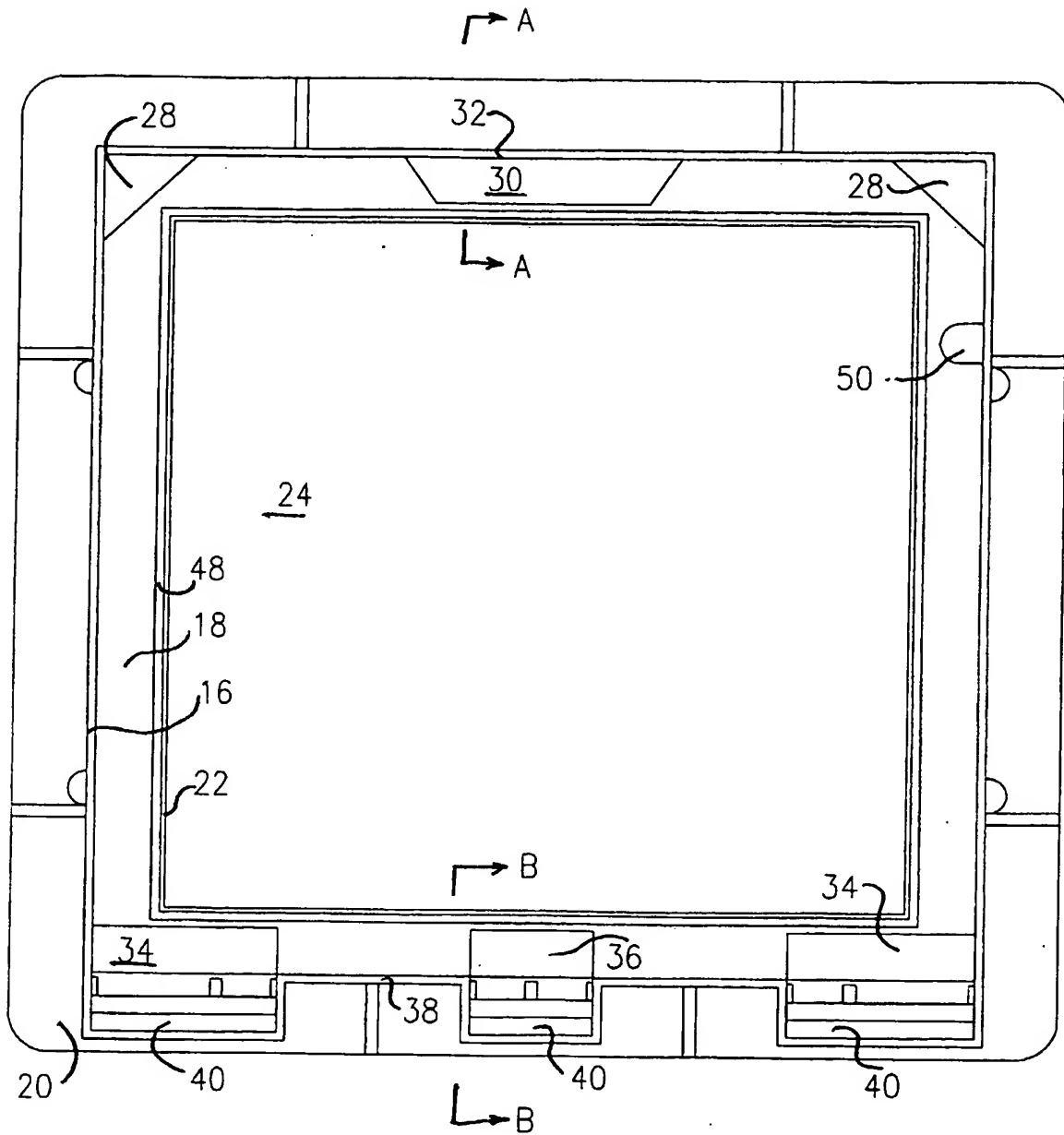
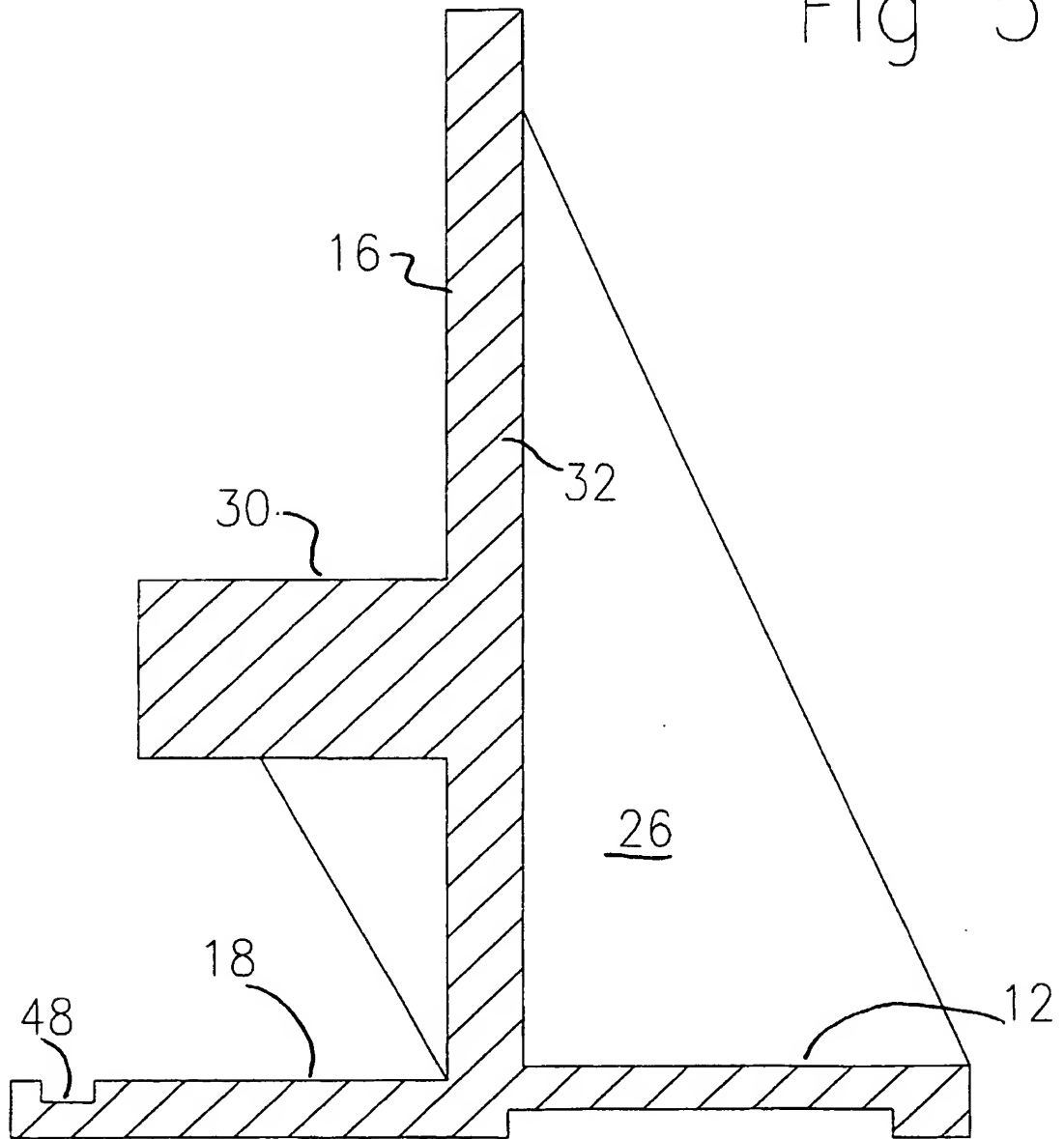


Fig 5



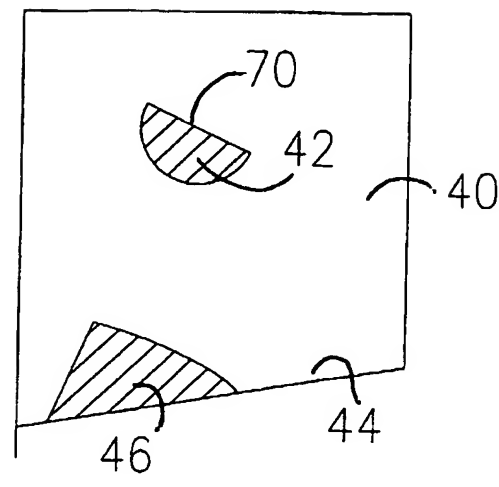
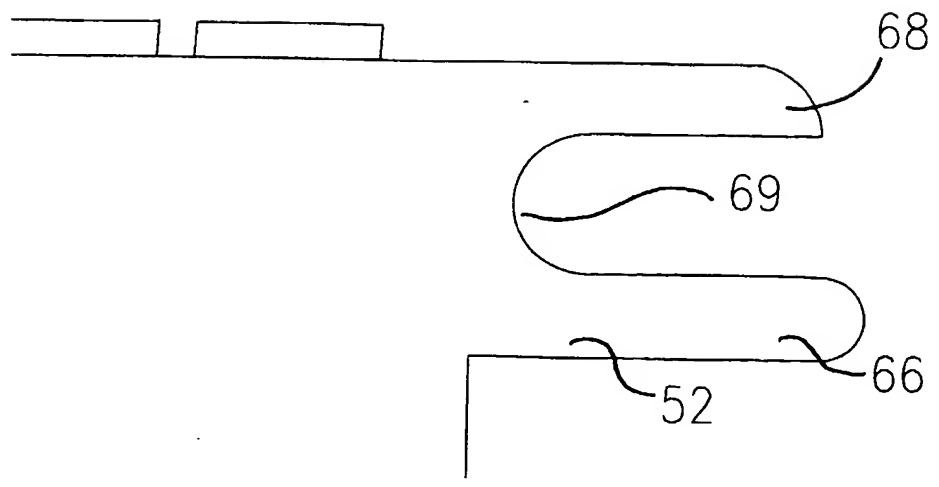


Fig 6

Fig 7



6 / 6

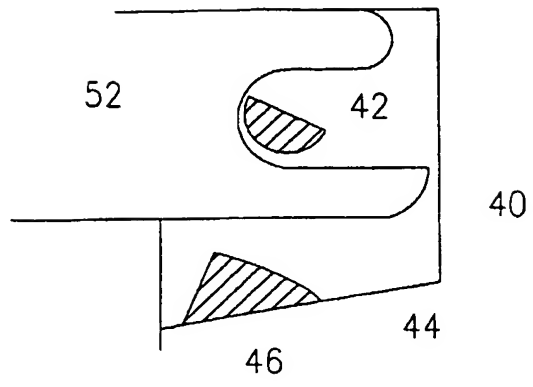


Fig 8a

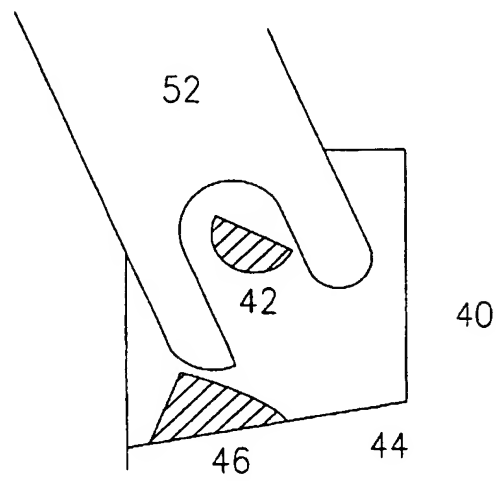
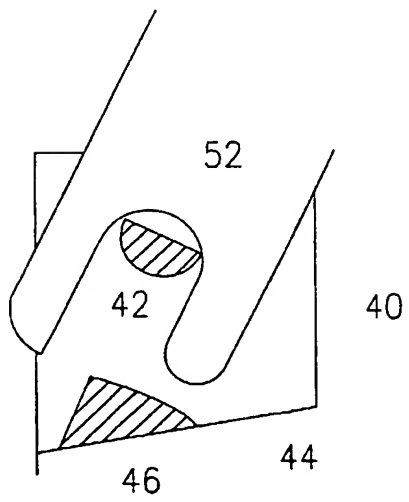


Fig 8b



Fif 8c



### A Manhole Cover or Gully Grating

The invention relates to a manhole cover or gully grating.

5 A commonly seen manhole cover has a square frame mounting two triangular cover parts which are generally in the shape of isoceles right-angle triangles. The frame has a seat at each corner of the clear opening on which the corners of the cover parts rest. Each cover part is therefore supported at the three corners and so will not rock when traffic passes over it. Rocking creates unwanted noise and can also reduce the life of  
10 the cover. The cover parts and frame are made of cast iron or ductile iron and have to withstand heavy traffic and so the cover parts and frames are very heavy. When it is desired to open the manhole cover the cover parts must be removed, which risks injury to the operator because of the weight of the cover parts.

15 Another known manhole cover therefore has the parts hinged to the frame to reduce the weight to be lifted and remove the possibility of the cover parts slipping sideways when lifted. The frame is square and the cover parts are hinged to opposite sides of the square frame. The cover parts rest in the open condition just past the vertical. This arrangement of the cover parts however means that the cover parts obstruct access to  
20 the manhole.

According to one aspect of the invention there is provided a manhole cover or gully grating comprising a frame and a plurality of cover or grating parts, the parts all being hinged to the same side of the frame, each part being of generally triangular shape.

25

In this way, when the cover or grating parts are opened, the manhole or gully can be accessed from every side of the clear opening except the side to which the parts are hinged. In the case of a rectangular cover therefore three sides out of the four of the opening to the manhole or gully are clear as opposed to two sides out of four for the  
30 known cover, a significant improvement in accessibility.

Each part preferably is substantially in three point contact with the frame. This prevents rocking, as previously described.

5 According to a further aspect of the invention there is provided a manhole cover or gully grating comprising a frame and a plurality of cover or grating parts, the parts all being hinged to the same side of the frame and the opening defined by the frame to receive the parts being generally square in plan.

10 Each part is preferably of generally triangular shape and preferably is in substantially three point contact with the frame.

Preferably there are an even number of parts. Preferably there are four or more parts and most preferably there are four, six or eight parts. Two adjacent parts are preferably arranged to be loosely connected together so that they can be lifted together.  
15 Additionally or alternatively, one part may include a formation overlapping a second part so that the first part can be lifted together with the second part. The parts may conveniently be arranged to sit on seats of the frame. One seat may bear the corners of two or more parts, preferably four parts.

20 At least one part can preferably be locked to the frame.

The seats for the parts may be arranged outside the clear opening of the frame and the hinges for the parts may be arranged outside the clear opening of the frame. In this way, the clear opening is indeed clear, further improving access.

25

In a preferred embodiment, the parts are retained in the open position. The hinge for each part is preferably made of only two elements and preferably each element is integral with the respective frame or part for example by integral casting. The hinge for each part may take any suitable form and in a preferred embodiment consists of a fork  
30 on one element which receives a boss on another element. The boss and fork are preferably shaped so that the part moves downwards after a certain angle of movement, and a member on the part then engages a member on the frame to inhibit movement in

the return direction. The fork and boss may be shaped so that the fork has a rounded engagement surface and part of the boss has a non-rounded engagement surface. The boss may include a rounded surface and may include a flat which may thereby enable the downwards movement. In a preferred embodiment the fork is on the part and the boss is on the frame.

According to another aspect of the invention there is provided a manhole cover or gully grating comprising a frame and at least one cover part or grating part, the or each part being hinged to the frame by a hinge made of only two elements, a fork and a boss, the fork being integral with the part and the boss being integral with the frame, the fork receiving the boss to pivot thereon, the boss including an upwardly facing substantial flat, the frame including a member behind which one arm of the fork drops when the cover part is open to thereby inhibit movement of the part in the closing direction.

In this way no separate parts are required for the hinge assembly, the manhole cover or gully grating can consist only of cover or grating parts and the frame. Assembly is easy as the fork of the or each part is simply dropped on to the respective boss of the frame.

The part or parts are often made of cast iron or ductile iron and therefore can be very heavy, but the part or parts cannot accidentally close because of the interaction of the fork and the member of the frame. Thus the manhole cover or gully grating of the invention, although it is simple in design, and easy to manufacture, is also safe.

Preferably the end of said arm of the fork is angled to form a contact surface to contact the member on the frame. Additionally or alternatively, said member on the frame may include an angled guide surface to contact the said arm of the fork.

An embodiment of the invention will now be described by way of example and with reference to the accompanying drawings, in which:

- Figure 1 is a perspective view of the manhole cover of the embodiment;
- Figure 2 is the view of Figure 1 with two cover parts opened;
- Figure 3 is a plan view of the manhole cover in the closed position;

- Figure 4 is a plan view of the frame with the covers removed;  
 Figure 5 is an elevation in cross section at A-A of Figure 4;  
 Figure 6 is an elevation in cross section at B-B of Figure 4;  
 Figure 7 is a fragmentary detail view of one end of a cover part in elevation; and  
 5 Figures 8a to 8c are elevations showing different degrees of pivoting at the hinge.

The manhole cover 10 of the embodiment of the invention consists of a frame 12 and four cover parts 14.

- 10 The frame is generally in an inverted T shape in cross section (see Figure 5) and comprises an upright wall 16 and inner and outer flanges 18, 20 extending generally horizontally from the lower edge of the wall 16. The flanges 18, 20 are generally of constant width. The frame 10 is generally square. The inner edge 22 of the inner flange 18 defines a central opening 24. Buttress flange webs 26 are provided between the  
 15 outer flange 20 and the upright wall 16. A seating 28 is provided as a web between adjacent sides of the upright wall 16 in two adjacent corners. A further web 30 in the shape of an inwardly protruding trapezium is provided centrally of the section of the wall 32 between the corner webs 28. Three rectangular seats 34, 36 are provided on the wall section 38 opposite the wall section 32. The rectangular seats 34, 36 are arranged  
 20 one in each corner and the other 36 centrally. The corner seats 34 are wider than the central seat 36. The seats 28, 30, 34, 36 are arranged with their upper support surfaces at about half the height of the upright wall 16. Behind each seat 34, 36 the wall 38 is diverted outwards to form a pocket 40. Each pocket 40 includes a boss 42 above the floor 44 of the pocket 40 and a cam 46 on the floor 44 of the pocket 40 (see Fig. 6).

25

The inner flange 18 includes an upwardly facing channel 48 which runs all the way round the inner flange 18 adjacent the inner edge 22 (see Fig. 4).

- A semicircular lug 50 protrudes inwards from the upright wall 16 in a section of the  
 30 upright wall 16 between the sections 32, 38 and adjacent one of the triangular corner seats 28.

The seats 28, 30, 34, 36 and lug 50 which protrude inwards from the upright wall 16 do not overlap the central opening 24 when the frame 12 is viewed in plan (see Figure 4).

Turning now to the cover parts 14, there are four cover parts 14a, b, c d.

5

Each cover part 14 includes two forks 52 which receive the bosses 42 to hingingly connect each cover part 14 to the wall 38 of the frame 10. Each cover part 14 is very generally triangular in plan and comprises a plate like part 54 defining an upper walking surface 56 covered in raised squares 58 to provide grip (see Figs. 1 and 2). A wall 60 depends from the upper plate 54 adjacent the edge of the plate 54 so that the wall 60 and plate 54 form a box which is open downwardly. Strengthening ribs 62 depend from the plate 54 and extend inwardly from the corners of the box to meet centrally so that they form a Y shape in plan.

10

15 The cover parts 14a, b, c, d are arranged in series across the frame 12.

The first cover part 14a is hinged in the pocket 40 at one corner of the frame 12 and broadens towards its free end, which is arranged to seat on the corner seat 28 and central seat 30 on the opposite wall section 32 (see Fig. 3). The next cover part 14b in the series is hinged in the corner pocket 40 and the central pocket 40. It narrows towards the wall section 32 and seats on the central seat 30 on that wall. Between them, the first two cover parts 14a, 14b cover half of the area defined by the upright wall 16. The other two cover parts 14c, 14d are mirror images of the first two. The first two cover parts 14a, 14b are loosely bolted together by means of bolts 63 through the adjacent depending walls 60 of the cover parts.

20

25

A long rectangular lug 64 extends laterally from the underside of the plate 56 of the second cover part 14b to lie underneath the plate 54 of the third cover part 14c in the other half of the cover (see Figs. 2 and 3).

30

Looking now in more detail at the hinging mechanism as shown in Figs. 6 to 8c, the fork 52 consists of an arm 66 with a rounded end, and an arm 68 which tapers inwardly.

The intrusion 69 between the arms 66, 68 of the fork 52 is part circular. The boss 42 is in the form of a circular cross section peg but with a flat 70. The flat 70 is at a small acute angle to the horizontal.

- 5 One side of the cam 46 lies directly beneath the boss 42 and rises on a large radius curve centred below the floor 44 to a peak behind the boss 44 falling away as a flat surface at a small acute angle to the vertical.

All of the parts will be cast in cast iron or ductile iron and it is seen that, aside from the  
 10 bolts 63, no additional parts are required. Indeed, the cover 10 can be used without the bolts. The cover parts 14 are lowered so that the boss 42 is received in the forks 52. The adjacent walls 60 of the first and second parts 14a, 14b are bolted together, as are the adjacent walls 60 of the third and fourth parts 14c, d. The cover 10 is then ready for placement in a road or other surface in known manner. When it is desired to open the  
 15 cover 10, a hook is placed in a hole 72 in the plate 54 of the first cover part 14a. As the first cover part 14a is lifted, it will lift the second cover part 14b, because the two parts are connected by the bolts 63. The overlapping flange 64 will also cause the third cover part 14c to lift together with the second cover part 14b and as the fourth cover part 14d is bolted to the third cover part 14c that will also lift and all four parts 14 will be raised  
 20 together. If it is desired to reduce the lifting load, then the hook can be inserted into the fourth cover part 14d and that will just lift the third and fourth cover parts 14c, d. The first and second parts 14a, b can then be lifted separately. The load can be further reduced by omitting the bolts 63 between the cover parts 14. In that case, the first to fourth cover parts 14 can be lifted in turn.

25

Where the bolts 63 are used, the manhole cover 10 can be locked closed by providing a bore in the edge of the plate 54 of the fourth cover part 14d above the lug 50 and providing a tapped bore in the lug 50 so that a bolt can be screwed in to hold the cover  
 14 closed. Although only the fourth cover part 14d is bolted down, the bolts 63 to the  
 30 third cover part 14c will prevent the third cover part 14c from opening, and the lug 64 will prevent the second cover part 14b from opening, the bolts 63 between the first

cover part 14a and the second cover part 14b preventing the first cover part 14a from opening as well.

When each cover part 14 is opened, it is seen that one arm of the fork rides up the curved surface of the cam 46, and at the peak, drops down, as permitted by the flat 70 on the boss 42 to lock the cover part 14 in the position shown in Figure 2. In order to replace the cover part 14, the cover part must be lifted to disengage the arm and then the cover part 14 can be pivoted back again into the closed position.

10 The channel 48 can receive a rubber insert to mount a secondary internal cover.

It is seen by means of the invention a manhole cover with excellent access provided as three sides of the opening are unobstructed.

15 The fact that the seats 28, 30, 34, 36 and lug 50 do not overlap the central opening 24 means that the opening is of regular shape for optimum access.

Where the cover parts are bolted together, as mentioned previously they are bolted loosely and in that way some pivoting movement between the cover parts 14 can still take place. Thus, in the case of the first cover part 14a, for example, the cover part 14a is supported on the closely adjacent bosses 42 at one end and at the corner seat 28 and central seat 30 at the other end. It is therefore effectively in close to three point contact to inhibit rocking. The fact that it is loosely bolted to the second cover part 14b means that it is free to assume a three contact position rather than being constrained in its positioning by its connection to the next cover part.

In another embodiment (not shown) a manhole cover is provided which is 50% wider than the cover 10 of the first embodiment and includes two further cover parts which are identical to either the first and second or third and fourth cover parts 14. In a still further embodiment, a manhole cover is provided which is twice as wide as the cover of the first embodiment and in that case a further full set of cover plates identical to the first to fourth parts 14 of the first embodiment are provided.

**Claims**

1. A manhole cover or gully grating comprising a frame and a plurality of cover or grating parts, the parts all being hinged to the same side of the frame, each part being of generally triangular shape.  
5
2. A manhole cover or gully grating as claimed in claim 1, wherein each part is substantially in three point contact with the frame.
3. A manhole cover or gully grating as claimed in claim 1 or claim 2, wherein  
10 there are an even number of parts.
4. A manhole cover or gully grating as claimed in claim 1, 2 or 3, wherein there are four or more parts.
- 15 5. A manhole cover or gully grating as claimed in any preceding claim, wherein there are four, six or eight parts.
6. A manhole cover or gully grating as claimed in any preceding claim, wherein two adjacent parts are arranged to be loosely connected together so that they can be  
20 lifted together.
7. A manhole cover or gully grating as claimed in any preceding claim, wherein one part includes a formation overlapping a second part so that the first part can be lifted together with the second part.  
25
8. A manhole cover or gully grating as claimed in any preceding claim, wherein the parts are arranged to sit on seats of the frame.
9. A manhole cover or gully grating as claimed in any preceding claim, wherein  
30 one seat bears the corners of two or more parts.



10. A manhole cover or gully grating as claimed in any preceding claim, wherein there are four parts and one seat bears the corners of four parts.
11. A manhole cover or gully grating as claimed in any preceding claim, wherein  
5 at least one part can be locked to the frame.
12. A manhole cover or gully grating as claimed in any preceding claim, wherein the seats for the parts are arranged outside the clear opening of the frame.
- 10 13. A manhole cover or gully grating as claimed in any preceding claim, wherein the hinges for the parts are arranged outside the clear opening of the frame.
14. A manhole cover or gully grating as claimed in any preceding claim, wherein the parts are retained in the open position.
- 15 15. A manhole cover or gully grating as claimed in any preceding claim, wherein the hinge for each part is made of only two elements.
16. A manhole cover or gully grating as claimed in claim 15, wherein each element  
20 is integral with the respective frame or part.
17. A manhole cover or gully grating as claimed in any preceding claim, wherein the hinge for each part consists of a fork on one element which receives a boss on the other element.
- 25 18. A manhole cover or gully grating as claimed in claim 17, wherein the boss and fork are shaped so that the part moves downwards after a certain angle of movement, and a member on the part then engages a member on the frame to inhibit movement in the return direction.
- 30 19. A manhole cover or gully grating as claimed in claim 17 or claim 18, wherein a portion of the boss has a non-rounded engagement surface.

20. A manhole cover or gully grating as claimed in claim 19, wherein the boss includes a flat.

21. A manhole cover or gully grating as claimed in any of claims 17 to 20, wherein  
5 the fork is on the part and the boss is on the frame.

22. A manhole cover or gully grating as claimed in claim 21, wherein the said member on the part is an arm of the fork.

10 23. A manhole cover or gully grating comprising a frame and at least one cover part or grating part, the or each part being hinged to the frame by a hinge made of only two elements, a fork and a boss, the fork being integral with the part and the boss being integral with the frame, the fork receiving the boss to pivot thereon, the boss including an upwardly facing substantial flat, the frame including a member behind which one  
15 arm of the fork drops when the cover part is open to thereby inhibit movement of the part in the closing direction.

24. A manhole cover or gully grating as claimed in claim 22 or 23, wherein the end of said arm of the fork is angled to form a contact surface to contact the member on the  
20 frame.

25. A manhole cover or gully grating as claimed in claim 22, 23 or 24, wherein said member on the frame includes an angled guide surface to contact the said arm of the fork.

25

26. A manhole cover or gully grating as claimed in any of claims 17 to 25, wherein the fork has a rounded surface to engage the boss.

27. A manhole cover or gully grating substantially as described herein with  
30 reference to the accompanying drawings.

**Amendments to the claims have been filed as follows**

1. A manhole cover or gully grating comprising a frame and a plurality of cover or grating parts, all of the said parts of the manhole cover or gully grating being hinged to the same side of the frame, each part being of generally triangular shape.

5

2. A manhole cover or gully grating as claimed in claim 1, wherein each part is substantially in three point contact with the frame.

10

3. A manhole cover or gully grating as claimed in claim 1 or claim 2, wherein there are an even number of parts.

4. A manhole cover or gully grating as claimed in claim 1, 2 or 3, wherein there are four or more parts.

15

5. A manhole cover or gully grating as claimed in any preceding claim, wherein there are four, six or eight parts.

20

6. A manhole cover or gully grating as claimed in any preceding claim, wherein two adjacent parts are arranged to be loosely connected together so that they can be lifted together.

25

7. A manhole cover or gully grating as claimed in any preceding claim, wherein one part includes a formation overlapping a second part so that the first part can be lifted together with the second part.

8. A manhole cover or gully grating as claimed in any preceding claim, wherein the parts are arranged to sit on seats of the frame.

30

9. A manhole cover or gully grating as claimed in any preceding claim, wherein one seat bears the corners of two or more parts.

10. A manhole cover or gully grating as claimed in any preceding claim, wherein there are four parts and one seat bears the corners of four parts.
11. A manhole cover or gully grating as claimed in any preceding claim, wherein  
5 at least one part can be locked to the frame.
12. A manhole cover or gully grating as claimed in any preceding claim, wherein the seats for the parts are arranged outside the clear opening of the frame.
- 10 13. A manhole cover or gully grating as claimed in any preceding claim, wherein the hinges for the parts are arranged outside the clear opening of the frame.
14. A manhole cover or gully grating as claimed in any preceding claim, wherein the parts are retained in the open position.  
15
15. A manhole cover or gully grating as claimed in any preceding claim, wherein the hinge for each part is made of only two elements.
16. A manhole cover or gully grating as claimed in claim 15, wherein each element  
20 is integral with the respective frame or part.
17. A manhole cover or gully grating as claimed in any preceding claim, wherein the hinge for each part consists of a fork on one element which receives a boss on the other element.  
25
18. A manhole cover or gully grating as claimed in claim 17, wherein the boss and fork are shaped so that the part moves downwards after a certain angle of movement, and a member on the part then engages a member on the frame to inhibit movement in the return direction.  
30
19. A manhole cover or gully grating as claimed in claim 17 or claim 18, wherein a portion of the boss has a non-rounded engagement surface.

20. A manhole cover or gully grating as claimed in claim 19, wherein the boss includes a flat.
21. A manhole cover or gully grating as claimed in claim 20, wherein the flat is at a small acute angle to the horizontal.
22. A manhole cover or gully grating as claimed in any of claims 17 to 21, wherein the fork is on the part and the boss is on the frame.
23. A manhole cover or gully grating as claimed in claim 22, wherein the said member on the part is an arm of the fork.
24. A manhole cover or gully grating as claimed in any preceding claim, wherein one triangular part is hinged to the frame by one side of the part and the or an adjacent part is hinged to the frame by a point of its triangular shape.
25. A manhole cover or gully grating as claimed in any preceding claim, wherein the opening defined by the frame to receive the parts is generally rectangular in plan.
26. A manhole cover or gully grating as claimed in any preceding claim, wherein the opening defined by the frame to receive the parts is generally square in plan.
27. A manhole cover or gully grating substantially as described herein with reference to the accompanying drawings.



INVESTOR IN PEOPLE

Application No: GB 0218151.9  
Claims searched: 1-22 & 26

Examiner: Charles Jarman  
Date of search: 6 December 2002

## Patents Act 1977 : Search Report under Section 17

### Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance	
X,Y	X:1-6,8, 12-16 Y:7,9-11, 17-22, 26	GB 2226841 A	(GLYNWED CONSUMER & BUILDING PRODUCTS LIMITED) See whole document and particularly p.4, lines 28-36, p.5, lines 10-14 and p.6, lines 1-15
Y	7,9-11, 17-22	EP 0808951 A1	(NORINCO) See particularly figures 4-6 and fig. ref. 5.
Y	17-22,26	EP 1201829 A1	(NORINCO) See particularly figures 4-9.

### Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

### Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC<sup>T</sup>:

E1G

Worldwide search of patent documents classified in the following areas of the IPC<sup>T</sup>:

E02D, E03F

The following online and other databases have been used in the preparation of this search report:

EPODOC, WPI, PAJ

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☐ FADED TEXT OR DRAWING
- ☐ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☒ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☒ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**